

C17. CHAPTER 17  
RISK-BASED SITING

C17.1. SCOPE

*This chapter provides guidance and minimum requirements for quantitative risk-based siting. It provides the basis for quantifying the risks from a PES to personnel at each exposed ES (individual risk ( $P_f$ )) and at all exposed ES (group risk) by performing a QRA when the QD criteria of this Standard cannot be met. Procedures are provided for preparing, submitting, and periodically reviewing risk-based site plans.*

C17.2. RISK-BASED SITING TOOL

*C17.2.1. Safety Assessment for Explosives Risk (SAFER<sup>®</sup>) is a DDESB-approved software code (tool) for conducting risk-based explosives safety siting (DDESB TP 19 (Reference (at))). A detailed description of the approved risk and analysis approach and methodology (model) implemented in SAFER<sup>®</sup> is given in DDESB TP 14 (Reference (au)).*

*C17.2.2. The approved model for risk-based siting (Reference (au)) provides risk estimates for individual and group risks.*

*C17.2.2.1.  $P_f$  is a function of the probability of an explosives event, the probability of fatality given an event and exposure, and the exposure of one person.*

*C17.2.2.2. Expected fatalities ( $E_f$ ) is a function of the probability of an explosives event, the probability of fatality given an event and exposure, and the exposure of all persons within the risk-based evaluation distance.*

*C17.2.2.3. The approved model treats those risk estimates as statistical distributions.*

*C17.2.3. The approved model is only applicable if all PES are separated by IMD IAW this Standard, or the individual NEWQDs for each PES are summed and treated as a single PES.*

C17.3. RISK-BASED SITE PLANNING REQUIREMENTS

*C17.3.1. A risk-based explosives safety site plan submitted to the DDESB for approval must satisfy these conditions:*

*C17.3.1.1. Have in place a current QD waiver, exemption, or Secretarial Certification, or an approved justification for the proposed siting. In the latter case, the DoD Component shall determine procedures for approving the justification. The DoD Component-approved justification shall be provided with the risk-based explosives safety site plan; this justification is provided for information purposes only and is not subject to DDESB approval.*

*C17.3.1.2. Use the latest approved version of the SAFER<sup>®</sup> code or equivalent DDESB-approved analysis tools for risk-based explosives safety site plan assessments. (See paragraph C17.7. for requirements for equivalent analysis tools.) The DoD Components may submit explosives safety site plans to the DDESB for approval that were initiated under previous versions of SAFER<sup>®</sup> or the equivalent DDESB-approved analysis tool.*

*C17.3.1.3. Evaluate all ES within the ES group exposed by the PES (of the PES/ES pair not meeting QD separation criteria). The ES group is defined as those ES out to a distance from the PES where contributions to  $P_f$  are no longer significant (i.e., out to the risk-based evaluation distance where  $P_f$  is equal to  $1 \times 10^{-8}$  for an individual present 24/7/365 in the open or IBD, whichever is greater).*

*C17.3.1.4. Determine  $P_f$  by summing the risks from all PES that expose the ES to significant risk (i.e., from all PES for which the ES is in the ES group exposed by the PES).*

*C17.3.1.5. Evaluate ES exposed to a new PES and include significant risks from all other PES.*

*C17.3.1.6. Determine group risk by summing all  $P_f$  as explained in paragraph C17.3.1.4., for all of the ES within the ES group, as defined in paragraph C17.3.1.3.*

*C17.3.1.7. Use (i.e., input) the full siting amount (NEWQD) and full yield.*

*C17.3.1.8. Accept, as the DoD Component, the risks not evaluated by the DDESB-approved risk tool (i.e., risks to facilities, equipment, assets, and mission). (This risk acceptance by the DoD Component does not address other violations of this Standard.)*

*C17.3.1.9. Ensure the results of the QRA satisfy the criteria of Table C17.T1.*

*Table C17.T1. Risk-Based Explosives Siting Acceptance Criteria*

<i>RISK TO:</i>	<i>CRITERIA:</i>
<i>Any one related individual – Related <math>P_f</math></i>	<i><math>\leq 1 \times 10^{-4}</math> per year</i>
<i>All related individuals – Related <math>E_f</math></i>	<i><math>\leq 1 \times 10^{-3}</math> per year</i>
<i>Any one unrelated individual – Unrelated <math>P_f</math></i>	<i><math>\leq 1 \times 10^{-6}</math> per year</i>
<i>All unrelated individuals – Unrelated <math>E_f</math></i>	<i><math>\leq 1 \times 10^{-5}</math> per year</i>

#### *C17.4. RISK-BASED EXPLOSIVES SAFETY SITE PLAN DOCUMENTATION REQUIREMENTS*

*Risk-based explosives safety site plans submitted to the DDESB for approval must include:*

*C17.4.1. DoD Component approved justification for not meeting QD. (See paragraph C17.3.1.1.)*

*C17.4.2. Explanation of assumptions made for the inputs in the DDESB-approved risk tool to define the situation to be analyzed.*

*C17.4.3. Explanation of inputs used in the DDESB-approved risk tool.*

*C17.4.4. Summary of results compared to the risk-based siting acceptance criteria IAW Table C17.T1.*

*C17.4.5. Data required IAW paragraph C5.4.3. (Site plan documentation is required.)*

## **C17.5. RISK-BASED EXPLOSIVES SAFETY SITE PLAN REVIEW REQUIREMENTS**

*DDESB-approved risk-based site plan reviews shall be conducted:*

*C17.5.1. By the originating DoD Component a minimum of every 5 years to ensure that siting conditions have not changed. If conditions have not changed, this information shall be documented in the site plan files at the installation and at the DoD Component confirming the continued acceptable status of the site plan. If conditions have changed, paragraph C17.5.2. shall be applied.*

*C17.5.2. Whenever DDESB-approved siting assumptions and the risk-based program inputs change and those changes have a potential increase on individual or group risk, or if there is uncertainty as to what the risk impact will be. Examples of changes that might increase individual and group risk are: adding additional personnel to an ES; adding a new ES; increasing NEWQD at a PES; adding a new PES; a change in PES mission; changes in ES construction. In such cases, the existing risk-based explosives safety site plan shall be updated and re-evaluated to determine the risk impact of the changes using one of these methods:*

*C17.5.2.1. If risk does not violate the acceptance criteria in Table C17.T1., a revised risk-based explosives safety site plan shall be prepared IAW the procedures in paragraphs C17.3. and C17.4. and submitted to the DDESB for approval.*

*C17.5.2.2. If risk does violate the acceptance criteria in Table C17.T1. but does not increase beyond the DDESB-approved risk-based siting criteria in effect at the time the explosives safety site plan was previously approved, a revised risk-based explosives safety site plan shall be prepared IAW the procedures in paragraphs C17.3. and C17.4. and submitted to the DDESB for approval.*

*C17.5.2.3. If the risk violates both the acceptance criteria in Table C17.T1. and the DDESB-approved risk-based siting acceptance criteria in effect at the time the explosives safety site plan was previously approved, the DDESB-approved risk-based siting is no longer valid, and the DDESB must be so notified.*

*C17.6. QUANTITATIVE RISK MANAGEMENT COMPARATIVE ANALYSIS*

*It is recommended that a DDESB-approved risk-based assessment model be used for conducting comparative analyses for risk management purposes. (See paragraph C17.3.1.2.)*

*C17.7. EQUIVALENT RISK-BASED ANALYSIS TOOL*

*An equivalent risk-based analysis tool for use in risk-based siting must meet these requirements to be approved by the DDESB:*

*C17.7.1. Address all applicable aspects of the approved risk-based model. (See Reference (au).)*

*C17.7.2. Document all data sources used to develop the algorithms used in the model.*

*C17.7.3. Provide software validation and verification results to the DDESB for an assessment and have the software certified by the DoD Information Technology Security Certification and Accreditation Process.*

*C17.7.4. Provide the results of a peer review of the model to the DDESB for an assessment.*